

CLAIMS

1. A method of controlling a contact angle of water on a hydrophilic surface of an article which comprises:
 - 5 (1) a step for releasing a substance for increasing a contact angle of water which provides a surface having a contact angle of water larger than that of the hydrophilic surface of the article, from a material for controlling a contact angle of water which contains the substance for increasing a contact angle of water, and
 - 10 (2) a step for increasing the contact angle of water on the hydrophilic surface of the article by bringing the released substance for increasing a contact angle of water into contact with the surface of the article to adhere the substance to the surface of the article.
- 15 2. The method of control of Claim 1, wherein means to release the substance for increasing a contact angle of water from the material for controlling a contact angle of water is application of energy.
- 20 3. A method of controlling a contact angle of water on a surface of an article, in which the article surface is comprised of a substance being capable of decreasing a contact angle of water by application of energy and the method comprises:
 - (1) a step for releasing a substance for increasing a contact angle of water which provides a surface having a contact angle of water larger than that of the article surface, from a material for controlling a contact angle of water which contains the substance for increasing a

contact angle of water,

(2) a step for increasing the contact angle of water of the article surface by bringing the released substance for increasing a contact angle of water into contact with the article surface to adhere the substance to
5 the article surface, and

(3) a step for decreasing the contact angle of water on the article surface by applying energy to the article to which the substance for increasing a contact angle of water was adhered.

10 4. The method of control of Claim 3, wherein the contact angle of water on the article surface is controlled reversibly by repeating said steps (1) to (3).

15 5. The method of control of any of Claims 2 to 4, wherein the energy to be applied is light energy, thermal energy or electromagnetic energy.

20 6. The method of control of any of Claims 1 to 5, wherein the material for controlling a contact angle of water which contains the substance for increasing a contact angle of water comprises the substance for increasing a contact angle alone or is a liquid or solid containing the substance for increasing a contact angle of water.

25 7. The method of control of any of Claims 2 to 6, wherein a hydrophilic portion and a hydrophobic portion are selectively provided by selectively applying the energy to a specific region on the hydrophilic surface.

8. The method of control of Claim 7, wherein the energy to be applied is light energy or electromagnetic energy, and the energy is selectively applied by changing a wavelength of light or electromagnetic wave.

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9. The method of control of Claim 7, wherein the energy is selectively applied by changing an amount of the applying energy.

10. The method of control of Claim 7, wherein the energy to be applied is light energy and the light energy is applied selectively to a specific region on the hydrophilic surface through a light-shielding pattern to selectively provide a hydrophilic portion and a hydrophobic portion.

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11. The method of control of Claim 7, wherein means to selectively apply energy is irradiation of light.

12. The method of control of Claim 11, wherein a light source is a laser generator, an ultraviolet lamp or a mercury lamp.

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13. The method of control of Claim 11 or 12, wherein the method of light irradiation is an irradiation method being capable of changing a focus in the depth direction.

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14. The method of control of Claim 7, wherein means to selectively apply energy is irradiation of electron beam.

15. The method of control of any of Claims 3 to 13, wherein the substance being capable of decreasing a contact angle of water by application of energy is a substance having photocatalytic action.

5 16. The method of control of any of Claims 5 to 14, wherein the substance being capable of decreasing a contact angle of water by irradiation of light energy is titanium oxide.

10 17. The method of control of any of Claims 1 to 16, wherein the material for controlling a contact angle of water is polydimethylsiloxane containing the substance for increasing a contact angle of water.

15 18. The method of control of any of Claims 1 to 17, wherein the substance for increasing a contact angle of water is an organosilicon compound.

20 19. A method of forming a pattern having a different contact angle of water on a sheet-like article having a hydrophilic surface, which comprises:

25 (1) a step for releasing a substance for increasing a contact angle of water which provides a surface having a contact angle of water larger than that of the hydrophilic sheet-like article, from a material for controlling a contact angle of water which contains the substance for increasing a contact angle of water, and

(2) a step for forming a portion having an increased contact angle of water by bringing the released substance for increasing a contact angle

of water into contact with the sheet-like article surface with a mask pattern being placed between the substance for increasing a contact angle of water and the sheet-like article, to adhere the substance to the article surface in the form of pattern.

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20. A method of forming a pattern having a different contact angle of water on a sheet-like article having a hydrophilic surface, which comprises:

(1) a step for selectively releasing a substance for increasing a contact angle of water which provides a surface having a contact angle of water larger than that of the hydrophilic sheet-like article, from a material for controlling a contact angle of water which contains the substance for increasing a contact angle of water, by selectively applying energy to the material for controlling a contact angle of water through a mask pattern, and

(2) a step for forming a portion having an increased contact angle of water by bringing the selectively released substance for increasing a contact angle of water into contact with the sheet-like article surface to adhere the substance to the article surface in the form of pattern.

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21. The method of pattern formation of Claim 19 or 20, wherein means to release the substance for increasing a contact angle of water from the material for controlling a contact angle of water is application of energy.

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22. A method of forming a pattern, in which a sheet-like article surface is comprised of a substance being capable of decreasing

a contact angle of water by application of energy thereto and the method comprises:

- (1) a step for releasing a substance for increasing a contact angle of water which provides a surface having a contact angle of water larger than that of the sheet-like article surface, from a material for controlling a contact angle of water which contains the substance for increasing a contact angle of water,
- (2) a step for increasing a contact angle of water by bringing the released substance for increasing a contact angle of water into contact with the sheet-like article surface to adhere the substance for increasing a contact angle of water to the article surface, and
- (3) a step for forming a pattern having a different contact angle of water by selectively applying energy through a mask pattern to the sheet-like article to which the substance for increasing a contact angle of water was adhered, to decrease a contact angle of water on the energy-applied surface.

23. The method of pattern formation of any of Claims 19 to 22, wherein the energy to be applied is light energy, thermal energy or 20 electromagnetic energy.

24. The method of pattern formation of any of Claims 19 to 23, wherein the material for controlling a contact angle of water which contains the substance for increasing a contact angle of water 25 comprises the substance for increasing a contact angle alone or is a liquid or solid containing the substance for increasing a contact angle of water.

25. The method of pattern formation of any of Claims 19 to 24, wherein the sheet-like article is glass.

26. The method of pattern formation of any of Claims 19 to 5 24, wherein the sheet-like article is glass coated with titanium oxide which was subjected to hydrophilization treatment.

27. An article having, on its surface, a pattern formed by the method of pattern formation of any of Claims 19 to 26.

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28. A sensor chip substrate to be used for biochemical analysis which has, on its surface, a pattern formed by the method of pattern formation of any of Claims 19 to 26.

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29. The method of pattern formation of any of Claims 19 to 26, wherein the sheet-like article is a starting material for a lithographic printing plate and the formed pattern is a printing pattern.

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30. A lithographic printing plate having, on its surface, the pattern formed by the method of pattern formation of Claim 29.

31. A method of forming a pattern having a different contact angle of water on a sheet-like article having a hydrophilic surface, which comprises:

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(1) a step for bringing the hydrophilic surface of the sheet-like article into close contact with a pattern made of a material for controlling a contact angle of water which contains a substance for increasing a

contact angle of water which provides a surface having a contact angle of water larger than that of the sheet-like article,

(2) a step for releasing the substance for increasing a contact angle of water from the pattern made of the material for controlling a contact angle of water, and

(3) a step for forming a pattern having an increased contact angle of water by adhering the released substance for increasing a contact angle of water to the sheet-like article surface.

10 32. The method of pattern formation of Claim 31, wherein means to release the substance for increasing a contact angle of water from the material for controlling a contact angle of water is application of energy.

15 33. A method of forming a pattern having a different contact angle of water on a sheet-like article having a surface comprised of a substance being capable of decreasing a contact angle of water by application of energy thereto, said method comprises:

(1) a step for bringing the surface of the sheet-like article into close contact with a pattern made of a material for controlling a contact angle of water which contains a substance for increasing a contact angle of water which provides a surface having a contact angle of water larger than that of the sheet-like article,

20 (2) a step for applying energy to the sheet-like article through the pattern made of the material for controlling a contact angle of water, and

25 (3) a step for decreasing the contact angle of water of the

energy-applied region on the surface of the sheet-like article and increasing the contact angle of water by releasing the substance for increasing a contact angle of water from the pattern made of the material for controlling a contact angle of water to adhere the 5 substance for increasing a contact angle of water to the sheet-like article surface contacting the pattern made of the material for controlling a contact angle of water.

34. The method of pattern formation of Claim 32 or 33, 10 wherein the energy to be applied is light energy, thermal energy or electromagnetic energy.

35. The method of pattern formation of Claim 34, wherein the energy to be applied is light energy and the substance being 15 capable of decreasing a contact angle of water is titanium oxide.